one patient has shown considerable improvement in motor function, sustained at one year. The degree of improvement mirrors that seen with the third patient in the Scandinavian series, as reported recently in *Science*. Positron emission tomographic scans using G-L-[^{18}F]fluorodopa in these patients suggest that viable graft cells are producing dopamine within the striatum.

Neural transplantation is in its infancy. The optimal age at which the embryonic tissue should be harvested is reasonably clear, but the method of delivery, the number of cells implanted, the exact target within the striatum, unilateral versus bilateral transplants, the immunologic factors at play, and the use of growth factors are but some of the issues that still need to be more thoroughly addressed. We are clearly on the verge of a new era in which the restoration of function within the central nervous system will be commonplace.

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Endoscopic Neurosurgery

IMAGE-DIRECTED STEREOTACTIC METHODS have enabled the safe and precise placement of endoscopes into the brain. The miniaturization of endoscopic instruments has enabled the development of smaller-diameter endoscopes, which minimizes the disruption of normal brain in approaching deep lesions. Miniaturization and technical improvements have occurred in optics (rigid as well as fiberoptic systems), operating instruments (rigid and flexible microforceps), continuous suction and irrigation systems, and fiber systems for delivering laser energy. In addition, intraoperative ultrasonography through a burr hole allows real-time monitoring of intracranial contents.

Endoscopic systems have now been used in numerous situations with relatively low complication rates, including the aspiration of colloid cysts of the third ventricle, biopsy and resection of cystic and intraventricular tumors, the evacuation of intracerebral hematomas, and a terminal-third ventriculostomy through a foramen of Monroe for hydrocephalus in patients with aqueductal stenosis or pineal region tumors.

A recent series reported on 109 endoscopic procedures for the evacuation of hematomas and 24 for biopsy and subtotal resection of a variety of intracranial tumors. Surgical morbidity was approximately 4% in the patients with intracranial hemorrhage and negligible in the patients with tumors.

Whether the endoscopic treatment of such lesions can be more effective than conventional management remains to be demonstrated, but certainly such procedures can be carried out with a high degree of safety due to the precision of localizing techniques and minimal invasiveness of the endoscopic instruments.

With advances in endoscopic technology, surgical instrumentation, and energy delivery (laser), endoscopic neurosurgical techniques may become increasingly important in the management of a variety of intracranial disorders.

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Indications for Stabilization in the Management of Lumbar Disc Disease

THE DIAGNOSIS OF MECHANICAL INSTABILITY of the lumbar spine is difficult to make with certainty and frequently is a diagnosis of exclusion. Practitioners caring for patients with degenerative lumbar disc disease must never forget the anatomy of the back, the important stabilizing role of the ligaments, facet joints, facet capsules, and musculature, and the important anatomic relationship of the disc to the intervertebral foramina. Any patient who has had a previous back operation, especially for the removal of a degenerative disc, may have instability at the operative level. This is especially true at the L4-5 level, which is the most mobile of the lumbar spine. A number of patients in whom the "failed back syndrome" develops after disc excision are suffering from excessive mobility at a motion segment(s) and will benefit from a stabilization procedure; the trick is to identify those patients in whom further surgical intervention is likely to be beneficial.

Most patients who have mechanical instability of the spine will have both back and leg pain, but the back pain is predominant. On physical examination, they will have impressive muscle spasm of the paravertebral musculature and be unwilling to move the back except with flexion at the hips. Plain lumbar spine films in flexion and extension may show excessive movement of the injured motion segment(s), there may be evidence of pseudospondylolisthesis, and unexpected iatrogenic pars and facet fractures are not infrequently identified. Magnetic resonance imaging or myelography usually is not impressively abnormal; there may be residual scarring or mild disc bulging, but in most of these patients large structural lesions are absent. The best preoperative predictor of whether a particular patient will benefit from a fusion is the response to a trial of immobilization in an acrylic body jacket. This jacket cannot be removed and is left on for four to six weeks. Patients who will benefit from fusion are able to reduce substantially their requirement for medication, often become pain-free in the jacket, and will have fairly prompt recurrence of significant back pain when the jacket is removed and replaced with a rigid but removable brace.

A fusion operation can be accomplished by a number of techniques with and without instrumentation and with both anterior and posterior approaches. The basic key to obtaining a solid fusion is bone bridging across the area of motion. Instrumented fusions without adequate bone or proper attention to preparing the fusion bed will ultimately fail because the initial stability provided by the instrumentation is lost as the metal parts loosen with continued motion over time.

Because spinal fusion for patients with the failed-back syndrome carries no guarantee that symptoms will be ameliorated, patients should be considered as candidates for